Sam Steddy*

Compounds, composability, and morphological idiosyncrasy

https://doi.org/10.1515/tlr-2019-2026

Abstract: Working within the framework of Distributed Morphology (Halle and Marantz 1993, 1994), this paper offers a derivational analysis of the range of structures and the types of idiosyncrasy associated with compounding. Building on prior analysis by Harley (2009), compound structures are argued to vary according to the ways in which the head and the non-head of a compound are categorised. Specifically, if the non-head of a compound is acategorial, then the relationship between the compound head and non-head is non-decomposable. Based on data from Hebrew (Borer 2009), it is shown that this also makes the non-head inaccessible to independent syntactic-semantic operations, including coordination, and coreference with a pronoun. It is additionally shown that morphologically-conditioned allomorphy (Bobaljik 2012) may be conditioned between the compound head and a suffix, as constitutes part of a bracketing paradox (Williams 1981). Where categorisation of the head of the compound gives rise to effects of headedness, however, this allomorphy may be 'blocked' by the structure associated with exocentricity. The final sections of the paper consider exocentricity, and other interactions between idiosyncratic meanings and phonology, in further detail.

Keywords: compounding, decompositionality, morphologically-conditioned allomorphy

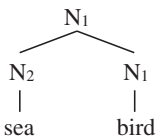
1 Compounding in morphological theory

Contemporary morphological and syntactic frameworks have offered little divergence from common assumptions about the structure of compounds until relatively recently. While some early generative work proposes that compounding is a transformational operation that applies to an underlying syntactic structure (Lees 1960), analysis of compounds has most often been based on the same assumptions as underlie early generative work (Chomsky and Halle 1968; Allen 1978; Levi 1978; see also ten Hacken 2009), in which it is generally presumed

***Corresponding author: Sam Steddy,** School of Languages, Linguistics and Film, Queen Mary University of London, Mile End Road, London E1 4NS, UK, E-mail: s.steddy@qmul.ac.uk

that compounds consist of two 'words' which are concatenated by a dedicated morphological compounding rule. To illustrate, a typically-assumed compound structure is given in (1). As compounds appear in the same positions as syntactic heads, they are taken to be complex heads, generated in situ by merger of one head to another, in this instance of nouns *sea* and *bird*. To capture the intuition that a *sea bird* is a bird, an additional principle of headedness applies wherein the element on the right (in English, and most other languages; see Williams 1981) projects its category and contributes a larger part of the compound's meaning as a whole.

(1)



Perhaps owing to the limited scope for variation afforded by the structure in (1), contemporary linguistic theory lacks a formal and consistent structural means of distinguishing contrasts of the type exemplified below:

(2)

a.	b.
linguistics book	*handbook*
chocolate cake	*pancake*
sea bird	*blackbird*
Seville orange	*blood orange*

Broadly characterised, this distinction relates to decomposability. The relation between the head of the compound and the non-head seems transparent in (2a), but less so in (2b): *handbooks* are books, but have little to do with hands – if anything – and *blood oranges* have less still to do with blood. *Pancakes* are usually made in pans, but not necessarily, and whether they are cakes or not is open to interpretation. *Blackbird*, with an adjectival non-head, refers to a particular species of bird which is typically black, though given that female blackbirds are brown, it may be considered that this is not entailed, or that the adjective *black* in this case is not interpreted literally. Despite the apparent imprecision in defining the ways in which a compound is decomposable (see Section 2 for more formal distinctions), the contrast between examples of the type in (2a) and (2b) is referred to hereon as a contrast between *decomposable* and *non-decomposable* compounds.

In lexicalist theories of morphology, this contrast would be accounted for by proposing the compounds in (2b) to be monomorphemic, or in some way lexicalised. This paper rejects this manner of explanation, and, working within the framework of Distributed Morphology (Halle and Marantz 1993, Halle and Marantz 1994), argues that contrasts of the type in (2) parallel the differing availability of idiosyncratic interpretation under Level I and Level II affixation (Siegel 1974; Allen 1978), for which contemporary derivational approaches are superseding prior lexicalist analysis (De Belder 2011; Lowenstamm 2014; Creemers et al. 2017; Newell 2017; or Raffelsiefen 1999 for a non-DM based account; contra, eg. Kiparsky 1973, Kiparsky 1985; Aronoff 1976). Compound structures are therefore to be examined in the light of contemporary implementations of level contrasts, though with particular reference to decomposability (Marantz 1997, Marantz 2001, Marantz 2013; Arad 2003, Arad 2005).

The analysis developed here focuses on what Scalise and Bisetto (2009) refer to as subordinate and attributive compounds, as opposed to coordinate compounds, which are analysed collectively as *asymmetric compounds*. Consequently, and owing to limitations of space, the study is predominantly concerned with right-headed, nominal, primary compounds in English (see Allen 1978; Williams 1981). Section 2 therefore examines, first, the effect of categorisation on the non-head of the compound, and, then, the derivation of idiosyncratic allomorphy in suffixed compounds. Section 3 then examines how the endo- versus exocentric distinction conditions allomorphy in both compounds and simple suffixed structures, before giving further consideration to the ways in which these two types of idiosyncrasy interact.

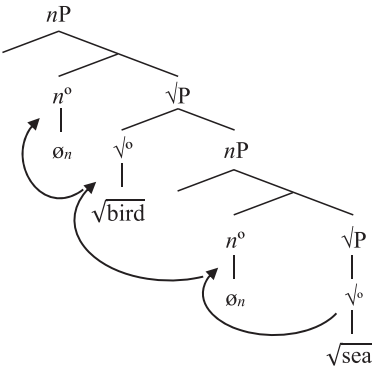
2 Compounds structures and their domains

Harley (2009) argues that compound structures are derived by the same principles that are widely taken to govern derivation by affixation in DM which, as discussed by Marantz (1997) in particular, have roots in transformational, syntax-based analysis (Chomsky 1970). She therefore argues, with acknowledgement to principles of head-incorporation (Baker 1988), that a morphosyntactic compound structure[1] (3b) is derived by the application of roll-up head

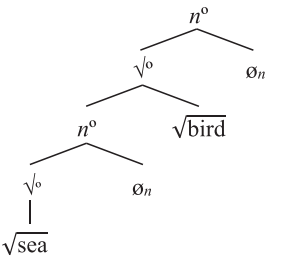
1 A few notes on representations are necessary here. Later sections of this paper consider idiosyncratic meaning and allomorphy which may be found in morphosyntactic structures as in (3b). As discussed by Harley (2006), the crucial morphemes in these structures – ie. the $\sqrt{\text{roots}}$ and categorisers which interact when interpretation is assigned, and when Vocabulary Insertion is conditioned – occupy terminal nodes. To make the distinction between head and terminal

movement to a syntactic structure (3a), which is built up from $\sqrt{\text{root}}$ and categorial morphemes:

(3) a.



b.



nodes clear, and to avoid confusion with the *compound head*, categorisers are referred to as *categorial morphemes*. A head n^o, for example, therefore dominates a terminal which houses a categorial morpheme corresponding to a classic nominalising suffix such as English *-tion*, or *-ity*, or a DM 'null' categoriser, represented in (3) as '$ø_n$', with a subscript category to distinguish it from other nulls such as '$ø_a$' or '$ø_v$'. (See later sections of this paper for a representational distinction between null morphemes of the same category.)

$\sqrt{\text{Roots}}$, being terminals, must also be dominated by a head '$\sqrt{}^o$', which projects to √P to allow for selection of a complement. This is instrumental to head movement which, under the implementation adopted, raises a head, together with the terminal it dominates, to become subordinate to a higher head, and so sister to the higher terminal. The $\sqrt{}^o$ head dominating the compound head's $\sqrt{\text{root}}$ thereby provides an attachment site for the moved constituent without the need for a projection rule to apply in morphosyntax, as is essentially assumed by Bobaljik (2012), or Marantz (1997), for who a $\sqrt{\text{root}}$ projects an identical node (which in other work is left unlabelled). The compound non-head's $\sqrt{\text{root}}$ must also project to $\sqrt{}^o$, despite not taking a complement, not only for the sake of theoretical parity, but significantly because this maintains consistent and asymmetrical structural relations between terminals, as will be shown to be vital for the analysis of locality within said domains of idiosyncrasy. Significantly, there is no node in the post-movement, morphosyntactic structure that is not also present in the underlying syntactic structure.

The resulting morphosyntactic structures are isomorphic with those developed by Bobaljik, or Sproat (1985), for example, though it should be noted that Bobaljik abstracts away from the question of categorisation, and makes no distinction between $\sqrt{\text{root}}$ and category morphemes. Otherwise, there is no significant difference to other systems of representations within DM, for instance Harley's three-tier schema that differentiates √P, the $\sqrt{\text{root}}$ itself, and the Vocabulary Item. Ultimately, it can be noted, the relevant (terminal) morphemes will always interact in sister-of-mother/daughter-of-sister (ie. aunt/niece) relations.

This derivation requires that the $\sqrt{\text{root}}$ forming the head of the compound select for a structure containing a $\sqrt{\text{root}}$ corresponding to the non-head. While this resembles selection of a thematic argument, particularly in the case of synthetic compounds (4a), Harley claims that the relationship between the head and non-head is pragmatically determined, by which it is meant that the different relations in examples like (4b) and (4c) are inferred rather than structurally derived.

(4) a. *truck driver* 'person who drives trucks'
b. *nurse shoes* 'Shoes *for* nurses'
c. *alligator shoes* 'Shoes *of* alligator (skin)'

(Harley 2009: Sections 3.2, 3.4)

2.1 Decomposable and non-decomposable compound structures

Regardless of the way in which the relation between the head and non-head of the compound varies in the cases above, this is a separate contrast to that distinguishing decomposable and non-decomposable compounds. Specifically, decomposable compounds (2a), and indeed (4), seem to entail the existence of the noun (or the literal interpretation of the adjective) corresponding to the compound's non-head. For example, there could be no *truck drivers* without trucks to be driven, and no *nurse shoes* were there not nurses to wear them. As discussed under (2), for non-decomposable compounds there is no similar entailment.

This logic has its roots in analysis by Arad[2] (2003, 2005) of different types of instrumental verbs (Kiparsky 1983, Kiparsky 1997). Given the contrast in (5), she proposes that the verb *hammer* is derived by affixing a verbalising morpheme to a $\sqrt{\text{root}}$ (6a), while the verb *tape* is derived by affixation to an already nominalised structure (6b).

2 The *Marantz/Arad Hypothesis* (as termed by Anagnostopoulou and Samioti 2014), which broadly states that idiosyncratic meanings may only be assigned by the first category morpheme to merge with a $\sqrt{\text{root}}$, has been revised in recent work by Anagnostopoulou and Samioti (2013, 2014), and by Marantz (2013). Both reach the conclusion that the domain in which such an interpretation may be assigned is delimited by a head projecting an agentive argument, or Voice. While these works consider derivations based on verbal structures, the compounds analysed here are predominantly nominal. As the relevance of Voice to nominal structure is not obvious, the hypothesis is assumed to hold throughout this paper (though see Footnote 3). See also Borer (2014), for further discussion of examples like (5).

(5) a. *He hammered the nail with a rock*
b. **She taped the picture to the wall with pushpins* (Arad 2003: 22–23)

(6) a. $[\sqrt{\text{hammer}}]\ \emptyset_v$
b. $[[\sqrt{\text{tape}}]\ \emptyset_n\ ]\ \emptyset_v$

Selection for and merger with acategorial or categorised structure in this manner underlies contemporary treatments of Level phenomena, not only as related to idiosyncratic interpretation, but also phonology[3] (Marvin 2002; De Belder 2011; Lowenstamm 2014; Nevins 2016; Creemers et al. 2017). Consider, for example, how LI suffixes interact for stress assignment, but LII suffixes do not. In DM, stress alternation of the type exemplified in (7), between a noun *atom* and adjective *atomic*, is not a result of the LI suffix *-ic* having a particular, potentially lexically-marked ability to 'shift' stress. Instead, as the noun must contain a null categoriser, the two forms in fact have isomorphic structures and are derived in parallel. On the understanding that categorisation triggers spellout, as LI suffixes are then realised in the same cycle as the $\sqrt{\text{root}}$

3 Since Marvin, recent derivational analyses of Level phenomena have proposed Level I affixation to have a subtly different structure to that presented in (7b). Based on the observation that many LI suffixes in fact do not define a particular category (i), it has been proposed that these suffixes are themselves $\sqrt{\text{roots}}$, and thus that categorisation, and consequent cyclic effects of the type exemplified in (7), depends on an outer null morpheme, as shown in (ii).

(i) tun-ic$_n$ terrif-ic$_a$
mag-ic$_n$ mag-ic$_a$
(ii) $[[\sqrt{\text{atom}}]\ \sqrt{-\text{ic}}]\ \emptyset_a$

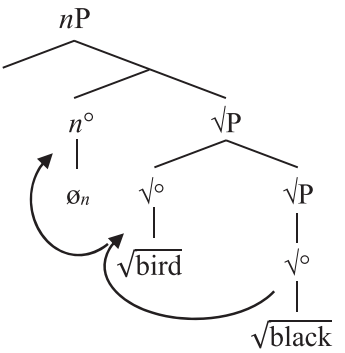
Creemers, Don, and Fenger offer a fine-grained typology of affixes according to both projection and selectional abilities. However, the focus of their study is the phonological properties of derivation, and as such the extension to the Marantz/Arad hypothesis (see previous Footnote) that is implied by theirs and others' analyses – that $\sqrt{\text{root}}$ affixes do not impede the assignment of idiosyncratic interpretation – remains to be fully explored. This does seem true for examples with multiple LI suffixes, for example *publicity*, whose interpretation does not transparently contain *public*, and whose structure would be isomorphic with that proposed for non-decomposable compounds in (8b). However, further investigating this hypothesis would raise questions that cannot be addressed in the present study, given limitations of space, and the intended focus on compounding. For example, should it be considered systematic that the idiosyncratic interpretation of *publicity* is also found in *publicist* and *publicise*, (but not *publican*,) and if so, how should this be derived? More generally, it is unclear what the syntactic or semantic contribution of an inner suffix would be in such a theory. Note also discussion under (8), which suggests that compounds with LI-suffixed non-heads are decomposable. This would not be expected to always be true under such a theory.

they select for,[4] stress alternation in this case is a consequence of the adjectival suffix adding an extra syllable to the domain over which stress is assigned. The LII suffix *-ish*, by contrast, shows no alternation from the apparent base noun, as LII suffixes select for already-categorised constituents, entailing an internal spellout cycle in which stress will have been determined.

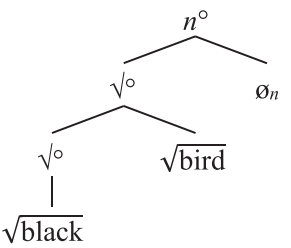
(7) a. $[\sqrt{\text{atom}}]\ \text{ø}_n$ → *átom*
b. $[\sqrt{\text{atom}}]$ -ic$_a$ → *atómic*
c. $[[\sqrt{\text{atom}}]\ \text{ø}_n\ ]$ -ish$_a$ → *átomish* (Adapted from Nevins 2016: 127-129)

It is proposed that the structures of decomposable and non-decomposable compounds differ along similar lines. If decomposable structures have a derivation as proposed by Harley, in which the compound head's $\sqrt{\text{root}}$ selects for a categorised non-head (3), then in a non-decomposable compound the non-head is selected for as an acategorial constituent:

(8) a.



b.



Despite appearances, then, the non-head *black* in *blackbird* is not an adjective but an acategorial root $\sqrt{\text{black}}$. In *sea bird*, by contrast, the non-head *sea* is a noun. By this logic, complementarily, a prediction is made that any compound whose non-head is overtly categorised should be decomposable. Analysis of examples attested in the GloWbE corpus (Davies 2013) suggests that this

4 See Lowenstamm (2014) and Newell (2017) for discussion of the different implementations of this model of spellout in DM, particularly as related to challenges to the *phase* and *edge*-based theory of morphological cyclicity that developed alongside broader syntactic analysis following Chomsky (2001).

prediction is correct.[5] The data below indicate that compounds with non-heads categorised by either a Level I or II suffix are decomposable, save for the case of two suffixes, *-er* and *-ing*, which appear to produce counterexamples.

(9) a. *referral fee* *magic show* *warden uniform*
tidal chart *lyric poem* *wooden horse*
librarian training *scholar exchange* *question mark*
equestrian contest *lunar calendar* *nativity play*
b. *childhood friend* *fitness regime* *membership application*
c. *anglerfish* *puffer jacket* *carpenter ant*
hummingbird *smoking jacket* *weeping willow*

If distinguishing compounds according to whether their non-heads are categorised or acategorial is considered an appropriate means of explaining decomposability,[6] then it would be advantageous to have a more precise means of

5 This claim is based on searches for a noun or adjective with a given suffix followed by a noun, using the CHART function of the search site at corpus.byu.edu/glowbe. The data seem generalisable after examining by hand the 200 attestations deemed most *relevant* (ie. not *frequent*) under the site's search metrics, which return data grouped by lemma (ie. the stem of the compound non-head) with a low rate of duplication. There are, of course, confounds to such an approach. For example, a search for '[word*er*]$_N$ [word]$_N$' returns forms that are not compounds (*per cent*), or where there is no suffix (*river water*). Additionally, it is not possible to search for compounds made up of two words not separated by a space, as often orthographically reflects non-decomposability. However, given that examples of the type in (9c) are often attested as both 'single' and 'two word' forms (*anglerfish* and *angler fish*), this is not taken to be critical. For the claim to be made as definitively as possible, larger-scale, scripted data collection will be necessary, a task which requires dedicated analysis in its own right, and so which is left for future research.

6 Under the DM implementations of Level-related phonology discussed above, the categorisation of the non-head that distinguishes decomposable and non-decomposable compounds should give rise to cyclic phonological effects. In other words, it would be predicted that there exist phonological correlates of the fact that non-decomposable compounds constitute a single phonological domain, but decomposable compounds do not. At a first glance, the varying availability of vowel reduction in examples like the following suggests this prediction is correct:

(i) *freshm*[ə]*n* / ??*freshm*[æ]*n* *spacem*[ə]*n* / *spacem*[æ]*n*

However, it is not clear that contrasts such as this would not be better attributed to metalinguistic effects. In the set of examples below, based on data from Borer (2005), the decomposable but more frequent *fireman* can be reduced to two syllables, while the non-decomposable *firefly* and exocentric *firework* (see Sections 3–3.1) cannot be. (These data have been verified with the pronunciation tools of the online version of the Oxford English Dictionary.)

classifying the two types of compound outside of intuitions about the entailments associated with the non-head. For this reason, analysis now considers data from Hebrew, which show how the decomposability of a compound affects the accessibility of the non-head for a number of independent syntactic-semantic operations.

2.2 Categorisation and accessibility of the compound's non-head

In Hebrew, a distinction exists between structures termed *compounds* and *constructs*, which are taken here to correspond to non-decomposable and decomposable compounds respectively.

(10) a. Compounds: *beyt sefer* *gan xayot*
house book 'garden animals'
'school' 'zoo'
b. Constructs: *beyt sar* *gan yerakot*
house minister garden vegetables
'a minister's house' 'vegetable garden'

Prior generative study has argued for a lexical versus derivational distinction between these structures, with Ritter (1988) in fact proposing a head-movement based derivation of constructs while assuming a lexical analysis of compounds. Contemporaneously, Borer (2009) provides a number of distinctions which allow for a more structural understanding of decomposability. Those that are relevant to the non-head of the compound are presented below, alongside English examples which illustrate the same point. First, coordination of the compound non-head is only possible with decomposable compounds (11a, 12a). Coordination of a non-head precludes any otherwise-viable non-decomposable interpretation (11b, 12b).

(ii) faɪ.ə(ɹ).mən faɪ.ə(ɹ).flaɪ faɪ.ə(ɹ).wɜ˞k
faɪ(ɹ).mən ??faɪ(ɹ).flaɪ ??faɪ(ɹ).wɜ˞k

Additionally, Andrew Nevins (pers.comm.) points out that compound stress may vary between Englishes: *peanut butter* has a stress pattern 1020 in US English, but 2010 in British English. Separation of these and any other conditioning factors on the phonology that is predicted by the proposed compound structures would require significant further analysis. With the study here focused on idiosyncratic meanings and allomorphy, this task is again left for future research.

(11) a. *gan* [*yeladim* *ve-xayot*]
garden [children and-animals]
'a garden for children and animals'

cf. i. *gan* *yeladim*
garden children
'nursery'

ii. gan xayot
garden animals
'zoo'

b. *'a zoo and a nursery'

(12) a. *a coconut and chocolate cake*
b. **a sponge and pancake*

Next, the non-head of a decomposable compound can be coreferent with a pronoun, but this is not possible for the non-head of a non-decomposable compound. Thus, below, if *beyt xolim* has a decomposable interpretation as 'patients' house', the non-head *xolim* - 'patients', may be coreferent with the pronoun *-am* - 'theirs'. However, if the structure has a non-decomposable interpretation as 'hospital', the same type of coreference is unviable. See Patel-Grosz and Grosz (2010) for a semantic implementation of this type of coreference.

(13) a. *beyt* *xolim* *ve-mitat-am* cf. *beyt* *xolim*
house patients and-bed-theirs house patients
'The patients'$_i$ home and their$_{i/j}$ bed 'hospital'
b. 'The hospital and their$_{j/*i}$ bed'

(14) a. *I made a chocolate$_i$ cake as it$_i$ was on sale at the supermarket*
b. **I made a pan$_i$cake then washed it$_i$ up*

Lastly, in a decomposable compound an adjective may modify the compound's non-head to the exclusion of the head. This is again not possible for non-decomposable compounds:

(15) a. *beyt* *ha-xolim* *ha-xadašim*
house the-patients the-new
'The new patients' houses'
b. *'The new hospital'

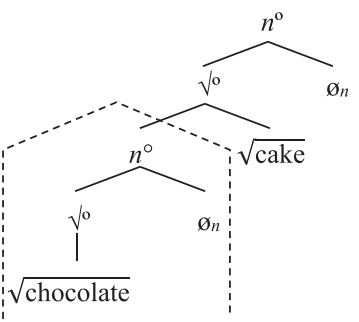
While this type of modification is not possible in English, similar facts pertain with the restrictor adverb *only*. The adverb can only target a compound's non-

head in a decomposable structure, making possible a crucial reading[7] in (16a), which is not available in (16b).

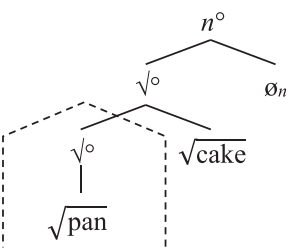
(16) a. *I only eat chocolate cakes*
'The only cakes I eat are chocolate cakes (but I eat other things too)'
b. *I only eat pancakes*
*'The only cakes I eat are pancakes (but I eat other things too)'
'The only thing I eat is pancakes'

To account for these asymmetries, it is proposed that the syntactic-semantic operations above – ie. coordination, pronoun coreference, and direct or *only*-modification (and conceivably others) – can only target categorised structures. This precludes interaction with the non-head of a non-decomposable compound (to the exclusion of the compound head and categoriser).

(17) a. Decomposable compound, with categorised non-head



b. Non-decomposable compound, with acategorial non-head



7 As a reviewer points out, this type of modification is available under contrastive stress. As Wennerstrom (1993) shows, however, contrasts of this nature do not necessarily require that stress falls on a syntactic unit of representation. The availability of this interpretation is therefore not taken as evidence that the compound's non-head must in fact be categorised.

(i) *I don't eat* CHOCOLATE *cakes, I only eat* PANcakes
(ii) *I said the children were wai*T^{H}*ing by the river, not wa*D*ing!* (adapted from Wennerstrom 1993: 10).

More in-depth analysis of category-dependent operations of this type would require significantly more detail than can be included in this paper, although some brief remarks can be offered on the relevance of DM-based principles of categorisation and interpretation to syntactic and semantic derivation. First, in the case of pronoun coreference, it seems rational that an uncategorised $\sqrt{\text{root}}$ cannot provide an interpretation to a pronoun as, until categorisation, its own interpretation would be undetermined. By similar logic, until a structure's interpretation – and category – is established, it cannot be modified (along the lines above) by a relevant modifying category, in this case an adverb. Lastly, the apparent restriction on coordinating $\sqrt{\text{roots}}$ is proposed to be related to frequently discussed principles which require that coordination apply to conjuncts of the same category (or semantic type) – see, for example, Partee and Rooth (1982), or Dowty (1988). This restriction is argued to follow from an understanding of these principles such that, in order for an acceptable coordination to be established, a conjunct must have a category in the first place. By definition, $\sqrt{\text{roots}}$ lack this, and so cannot be coordinated.

Importantly, what is gained from discussion in this section is that there are formal correlates of decomposability, and that these can be explained as a consequence of categorisation of the compound's non-head. If categorisation of the compound's non-head is taken to govern decomposability, the effect of categorisation on the compound's head remains to be examined. Section 3 argues that this bears on the distinction between endo- and exocentric structures, though as these show an interaction with a second type of idiosyncrasy, analysis turns first to idiosyncratic phonology, or rather *morphologically-conditioned allomorphy*.

2.3 Morphologically-conditioned allomorphy

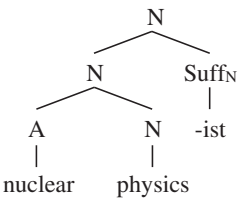
Suffixed compounds create a kind of bracketing paradox, one part of which is that the compound head and suffix may interact for allomorphy, or even suppletion (Williams 1981; Sproat 1984, 1985; Spencer 1988), as conditioned by morphological structure (Embick 2010; Bobaljik 2012):

(18) a. *nuclear physics schoolchild* *nuclear physicist schoolchildren* b. *medieval China twenty-one* *medieval Sinologist twenty-first*

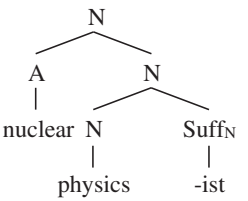
This is problematic if it is assumed that such allomorphy is dependent on constituency (see, for example, theories of non-terminal spellout, Weerman and Evers-Vermeul 2002; Neeleman and Szendrői 2007). Framing the question

differently, with reference to a now classical example,[8] if merger of the suffix *-ist* to the noun *physics* derives the allomorphic stem *physi[s]*, then it should not be taken for granted that the same process applies if the suffix does not directly merge with the noun. This is of particular concern if it is noted that allomorphy may fail to apply with certain compound structures, the most notorious example being the plural *walkmans*. There is, therefore, an incompatibility between the structure that seems to be required by phonology, in which the head of the compound and the suffix must form a constituent (19b), and the structure which seems to reflect interpretation, for which the suffix should take scope over the compound as a whole (19a):

(19) a.



b.



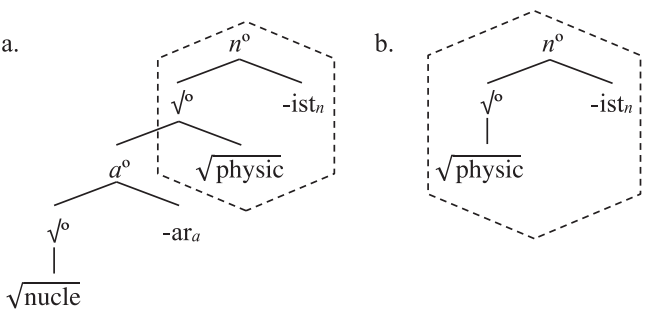
One means of overcoming this, as proposed by Sproat, Spencer, and also Ackema and Neeleman (2004), has been to develop morphological mapping principles in order to formalise a transformation in which one of the structures in (19) may be derived from the other. This logic has also been extended to other types of bracketing paradox – see Section 3.2. In accounting for the observed idiosyncratic allomorphy in such structures in DM, however, dedicated morphological transformations such as this become unnecessary, as contemporary implementations of allomorphy can be shown to operate based on locality rather than constituency. DM-based compound structures are much like the constituency in (19a), in that they have a categorial suffix which takes high scope, and which does not form a constituent with the compound head's $\sqrt{\text{root}}$. It is argued hereon that, as it will be possible to condition allomorphy between the compound head and suffix in a structure

8 The composition of *nuclear physicist* raises a few questions when considered in the detail afforded by DM. It is considered here that the *-s* of *physics* is a categoriser (and not a plural suffix, given *physics* causes singular agreement), and thus that *physi[k]* is the context-free realisation of a root $\sqrt{\text{physic}}$ (which surfaces elsewhere in the derivation of *physical*).

much like (19a), there will no longer be a need to entertain a level of representation as in (19b).

What is significant with a DM-based derivation, as contrasted with (19), is that the crucial suffix and $\sqrt{\text{root}}$ are as local in a compound as they would be in a simple suffixed derivation:

(20) a. b.



As such, it is possible to apply the same Vocabulary Insertion rule as governs the spellout of a $\sqrt{\text{root}}$ in a structure like (20b) to a structure like (20a). To this end, following the strictly morphosyntax-based theory of suppletion developed by Bobaljik (2012), the specific VI rule (21a) causes the root $\sqrt{\text{physic}}$ to be spelled out as *physi[s]* in the context of the suffix *-ist*. The bracket in the rule corresponds to the constituent √°, which the root $\sqrt{\text{physics}}$ is contained in in both structures above, albeit rather trivially in (20b). As the $\sqrt{\text{root}}$ is in the correct context in both compound and simple suffixed derivations, both types of structure allow for derivation of *physicist*. Elsewhere, spellout follows from the context-free rule (21b).

(21) a. $\sqrt{\text{physics}} \rightarrow$ *physi[s]*/__] *-ist*$_n$
b. $\sqrt{\text{physics}} \rightarrow$ *physi[k]*

Allowing for a single VI rule to condition morphological allomorphy between a $\sqrt{\text{root}}$ and suffix in both a compound and a simplex derivation provides an obvious gain in terms of theoretical simplicity. However, this does not yet explain why allomorphy does not apply in the case of examples like *walkmans*. This is to be accounted for as an effect of exocentricity.

3 Exocentricity and interactions between idiosyncrasies

In contrast to the non-decomposable compounds considered in Section 2, more wholly non-decomposable examples exist in which the compound as a whole refers to something that cannot be predicted based on the compound's head. This is the case for exocentric compounds (22b), which are distinguished from endocentric compounds (22a), albeit imprecisely, by the IS A test (Allen 1978; see also Snyder 2016). Borer (2009) also applies this as a diagnostic for compounds and constructs.

(22) a. *seabird* IS A bird
beyt sar IS A house (cf. 10)

b. *ladybird* IS NOT A bird
beyt xolim IS NOT A house (cf.13)

The endocentric versus exocentric contrast creates a subclassification within the class of non-decomposable compounds (23b,c). For both types, the relationship between the compound's head and non-head is unpredictable. For exocentric compounds (23c), however, the relationship between the head and the compound as a whole is unpredictable.[9] Although the term has never been precisely defined, compounds are typically described as exocentric if they have a different referent than the compound head would have in isolation, or if the compound's category differs from the head's in the same way, as is the case for *roughhouse*.

(23)	a.	b.	c.	
	seabird	*blackbird*	*ladybird*	'insect'
	camera man	*frogman*	*walkman*	'music player'
	chocolate cake	*pancake*	*yellowcake*	'uranium by-product'
	racehorse	*hobbyhorse*	*seahorse*	'sea creature'
	birdhouse	*greenhouse*	*roughhouse*	'to fight'

Exocentricity is not only an issue for analysis of idiosyncratic interpretation. Below, a small paradigm of *man* compounds (Peitsara 2006) illustrates that it is

9 There are two types of derivation that are worth noting here, but which seem not to create compounds in as large numbers. The first are exocentric compounds which seem to transparently entail their non-head, as would be the case for *seahorse*, or *discman*. The second are decomposable compounds whose non-head has an independent idiosyncratic interpretation assigned under categorisation (which should also be accessible to the operations described in Section 2.1). An example of this would be *hitman*, which, once interpreted as 'a person who performs *hits*', can be understood as decomposable. This is clearer still if compared with an example like *frogman* – 'scuba diver', which has no literal association with frogs nor any other potentially idiosyncratic derivation based on the root $\sqrt{\text{frog}}$.

exocentricity specifically, rather than general compound structure or non-decompositionality, that conditions the blocking of morphological allomorphy as discussed in the previous section.

(24) a.	*postmen*	**postmans*	*camera men*	**camera mans*
	gentlemen	**gentlemans*	*freshmen*	**freshmans*
	hitmen	**hitmans*	*frogmen*	**frogmans*
b.	*?walkmen*	*?walkmans*	*??Burning Men*	*Burning Mans*

In other words, the reason that, for example, *postman* has the same irregular plural as simple *man*, is that the compound still denotes a man. *Walkman*, by contrast, does not, and so does not (necessarily) pluralise in the same way. The same point is shown by smaller sets of contrasts, as found with other compounds (25a), and also with simple nouns (25b), which are also to be considered exocentric (see also Pinker and Prince 1988).

(25) a.	*schoolchildren*	*?brainchilds*	
	milk teeth	*sabretooths*	
	tealea[vz]	*Maple Lea[fs]*	'members of the Toronto Hockey team'
b.	*mice*	*mouses*	'devices for interacting with a computer'
	oxen	*oxes*	'louts/people born in the year of the Ox'
	man	*mans*	'extra lives in a videogame'[10]

The exocentric examples above are considered to show *regularisation*, as results if a specific allomorphy rule is prevented from applying. As these examples are all plurals, in a DM derivation the relevant VI rules must take the form of (26a), in which allomorphy is conditioned between a $\sqrt{\text{root}}$ and plural morpheme, specifically over a categoriser (Moskal 2015; Moskal and Smith 2016). The spell-out of the root $\sqrt{\text{man}}$ as *men* is therefore conditioned not in the direct context of a plural morpheme, but in the context of '$\emptyset_n$', which itself is in the context of the 'trigger' morpheme:

10 This usage has not been noted in prior research, but is attested in several places online. The example in context below is from a news story dated August 8, 2018, accessible at news.avclub.com/1828209390.

(i) *Nintendo finally went ahead and killed Luigi, a shocking turn of events that has the world wondering why Mario didn't just give his brother some extra* ***mans*** *and bring him back for the next level.*

(26) a. $\sqrt{\text{man}} \rightarrow$ *men*/__] $\emptyset_n$] PL
b. $\sqrt{\text{man}} \rightarrow$ *man*

For simple structures, Harley (2014) suggests the pattern of allomorphy above is evidence for different, (half-)homophonous $\sqrt{\text{roots}}$ (and consequently, that there is no regularisation). The two interpretations of *mouse*, therefore, would be derived from two different roots (or indexes), say '$\sqrt{\text{mouse}_1}$' and '$\sqrt{\text{mouse}_2}$', whose context-free allomorphs simply happen to be homophonous:

(27) a. [$\sqrt{\text{mouse}_1}$] $\emptyset_n$ → *mouse* 'small rodent with tail'
b. [$\sqrt{\text{mouse}_2}$] $\emptyset_n$ → *mouse* 'device for interacting with a computer'

By this logic, the different plural forms *mice* and *mouses* are then derived as, given VI rules are specified to particular $\sqrt{\text{roots}}$, a rule resembling (26a), targeting the $\sqrt{\text{root}}$ in (27a), would have no application to a structure containing a different $\sqrt{\text{root}}$ (ie. 27b).

An alternative to Harley's 'multiple $\sqrt{\text{root}}$' proposal is pursued by Arregi and Nevins (2014), who develop a 'single $\sqrt{\text{root}}$' analysis involving an anti-locality effect, much in the vein of Ackema and Neeleman's (2004: Ch. 5) analysis of regularisation in compounds. Arregi and Nevins examine the idiosyncratic positive interpretation of *bad* (Bobaljik 2012), whose comparative form is realised as *badder*, rather than suppletive *worse*:

(28) a. *Check out our **badder** alloy whels*
b. *Doom 2 is just such a bigger, **badder**, better version of Doom*[11]

This interpretation of *bad* is argued to be derived by an additional null morpheme, termed EVAL(UATIVE), which serves to convert the meaning of the inner adjective. As EVAL attaches between the category and comparative morphemes, as in (29b), it prevents the context of the VI rule (30a) from being met, thus leading to regularisation.

(29) a. [[$\sqrt{\text{bad}}$] $\emptyset_a$]CMPR *worse*
b. [[[$\sqrt{\text{bad}}$] $\emptyset_a$] EVAL] CMPR *badder*

(30) a. $\sqrt{\text{bad}} \rightarrow$ *worse*/__] $\emptyset_a$] CMPR
b. $\sqrt{\text{bad}} \rightarrow$ *bad*

11 Example (28a) is from Bobaljik (2012: 110). Example (28b) is from a trailer for the videogame *Doom 2* (accessible at youtu.be/OYoihHl3ZJc).

There is an issue with anti-locality, however, in that the predictability of the interpretation derived by a conversion morpheme varies. This brings any such analysis into conflict with theories of categorisation in DM, most specifically the Marantz/Arad hypothesis (see Footnote 2), under which category-external morphemes should provide a predictable interpretation. Consider, for example, how the relatively straightforward (and productive) interpretation of *ox* as 'person born in the year of the Ox' may suggest a derivation based on a noun. For the alternative interpretation as 'uncouth person' (Acquaviva 2009), this seems less clear. Unclearer still is the case of computer *mouse*, which seems, now, at least, far removed from its original visual metaphor (as in the gloss of 27a).

For cases with more idiosyncratic interpretations, at least, an alternative to conversion must be pursued. Basing this on Harley's proposed homophonous $\sqrt{\text{roots}}$, however, will prove problematic. While an analysis of select examples along these lines should not necessarily be precluded, any attempt to generalise will faces issues with the additional $\sqrt{\text{roots}}$ that the theory would predict, not least because of their number (Acquaviva 2009). Given the present study, it can additionally be pointed out that extending such an analysis to compounds would predict $\sqrt{\text{roots}}$ with an unusually limited distribution. Specifically, it would need to be explained why the different $\sqrt{\text{roots}}$ underlying the interpretations of, for example, *man* in *walkman* or in *Burning Man*, or of *bird* in *ladybird*, can only appear in compounds.[12]

12 An anonymous reviewer suggests that exocentric interpretation could be derived with a single $\sqrt{\text{root}}$ analysis based on *contextual allosemy* (Marantz 2013). This would involve derivation of a $\sqrt{\text{root}}$'s interpretation via allosemy rules that function similarly to VI rules (Nevins 2016). In the case of *walkman*, therefore, an idiosyncratic interpretation of $\sqrt{\text{man}}$ would be conditioned in the specific context of the non-head's root $\sqrt{\text{walk}}$. By this logic, the root $\sqrt{\text{man}}$ would have a basic interpretation as 'adult human male' derived by an elsewhere rule.

(i) $\sqrt{\text{man}} \rightarrow$ 'music player' / $\sqrt{\text{walk}}]$ __] $\emptyset_n$

Such an analysis would present similar issues to those faced by a multiple $\sqrt{\text{root}}$ analysis, in that additional explanation would, in this case, be required to account for simplex structures. That is, for a case like *mouse*, the only structure that an allosemy rule targeting a $\sqrt{\text{root}}$ could reference would be the categoriser, a possibility discussed (and restricted) in the following section. Contextual allomorphy also does not consistently capture the fact that the derivation of these interpretations may be productive. For example, the *man* of *Burning Man* has and may be used to name other festivals (one example being *Green Man*).

3.1 Different idiosyncrasies

An analysis of exocentricity is now proposed with application to both simplex and compound structures. In brief, this is based on anti-locality, though where an additional conversion morpheme has been assumed to condition both idiosyncratic interpretation and regularisation of allomorphy, the same effects are instead attributed to the presence of a *different categoriser*. To go into more detail, then, consider first an alternative analysis of Arregi and Nevins's (2014) *badder* in which EVAL attaches *inside* the categoriser (31a). While this would allow the morpheme to assign an idiosyncratic interpretation, it becomes apparent at this point that EVAL is essentially fulfilling the same role as a categoriser. Parsimony of analysis suggests, therefore, that EVAL be considered a categoriser in its own right (31b), thus obviating the need for the original, outer categoriser.[13]

(31) a. [[[$\sqrt{\text{bad}}$] EVAL] $\emptyset_a$] CMPR
b. [[$\sqrt{\text{bad}}$] EVAL_a] CMPR

A similar point is shown by compounds described as exocentric because their category as a whole does not match the category that the head would have in isolation. For example, the derivation of the idiosyncratic interpretation of the compound noun *meet cute* – 'a serendipitous meeting that leads to romance', not only suggests initial categorisation, but importantly defies analysis by conversion, as this would entail an inner adjectival compound structure which does not exist independently.

(32) a. [[$\sqrt{\text{meet}}$] $\sqrt{\text{cute}}$] $\emptyset_n$
b. *[[[$\sqrt{\text{meet}}$] $\sqrt{\text{cute}}$] $\emptyset_a$] $\emptyset_n$

Generalising, when exocentricity is not based on a change of category, this requires that for English, at least, a given $\sqrt{\text{root}}$ may be categorised and so assigned an interpretation by (at least) two different null morphemes of the same category (or perhaps two different flavours of categoriser, in the terms of

13 This analysis has the additional advantage of clarifying the class of morpheme that EVAL and its like belong to. Though Arregi and Nevins (2014) suggest, via reference to diminutives, that EVAL is an inflectional affix, this is considered problematic as permitting a null 'positivising' inflection would make for a means of derivation which is highly powerful, but which does not seem to have a use elsewhere in English. These morphemes are instead identified as categorisers (and not some third type of affix).

Folli and Harley 2005). Arregi and Nevins in fact propose such as analysis for the alternation between *destroy* and *destruct*, arguing that the former emerges only in the presence of an agent-introducing verbal categoriser, represented *v**. In all other contexts, including for the unaccusative verb (*self-*)*destruct*, which is considered to be categorised by a different verbaliser, *destruct* surfaces as the elsewhere allomorph:

(33) a. $\sqrt{\text{destr}} \rightarrow$ *destroy*/__] ø_{v*} 'destroy the village'
b. $\sqrt{\text{destr}} \rightarrow$ *destruct* '(self-)destruct, destruction'

For the exocentric examples considered here, novel categorisers are proposed to be represented 'δ', as *distinct* from the typical 'ø' . Ultimately, this is intended to indicate that a (null) categoriser is different from one specified in a given VI rule. This is intended to allow generalisation over a broader set of data than have been considered in prior studies, which, in any case, do not suggest that allomorphy-blocking categorisers share any common properties: Arregi and Nevins argue that 'ø_v' is different to 'ø_{v*}' on the basis of its argument structure, but Acquaviva (2009) proposes that a nominaliser '$\text{ø}_{n[\text{HUM}]}$' is distinct from the 'plain' nominaliser 'ø_n', as it carries a [HUMAN] feature. An illustration of the structures for *mouse* that makes use of this representation therefore follows:

(34) a. $[\sqrt{\text{mouse}}]\ \text{ø}_n \rightarrow$ *mouse* 'small rodent with tail'
b. $[\sqrt{\text{mouse}}]\ \delta_n \rightarrow$ *mouse* 'device for interacting with a computer'

This does not entail that every idiosyncratic interpretation assigned to a $\sqrt{\text{root}}$ is the product of a different categoriser.[14] In fact, principles of categorisation give little reason to consider either that a 'δ' categoriser is required for the derivation

14 An interesting asymmetry between word- and phrase-level idiosyncrasies emerges here. Certain verbs – and, it must be acknowledged, certain speakers – show regularisation in correlation with idiosyncratic interpretation. When the same verb appears in a larger idiom, however, allomorphy seems never to be regularised:

(i) *striked* 'having been on strike' (ii) *struck out*
hanged 'executed by hanging' *hung around*

Based on the discussion that follows, this suggests that the verb in an idiom is categorised by 'ø_v', permitting irregular allomorphy, but that idiosyncratically interpreted verbs may be categorised by 'δ_v'. As these interpretations conceivably correlate with different argument structures, analysis of these facts may follow Arregi and Nevins' (2014) derivation of the *destroy*/*destruct* alternation, as discussed above (33). Otherwise, nothing in the analysis developed here predicts that idioms could not be created by 'δ_v', so this apparent conspiracy must be left open for now.

of an exocentric interpretation, or that these should be considered distinct from idiosyncratic interpretations more generally. However, as the derivation of different interpretations under 'δ' would not run counter to these principles, and as 'δ' will be proven essential to conditioning of allomorphy, this possibility cannot be ruled out.

To illustrate the first of these points, consider that affixation of 'ø' or 'δ' to the root $\sqrt{\text{mouse}}$ is paralleled by the way that suffixes *-ist* and *-ian* may both categorise the root $\sqrt{\text{physic}}$, for example. The fact that the interpretations of the resulting nouns *physicist* and *physician* seem much more clearly related than those of *mouse* and *mouse* could be taken as reason to propose the exocentric interpretation of *mouse* is attributable to 'δ' (as in 34b). Strictly, though, principles of categorisation do not require this: whether the interpretations of a $\sqrt{\text{root}}$ seem related or not is incidental to the means by which these are derived, ie. by $\sqrt{\text{root}}$-affixation (as opposed to category-affixation). Consider, furthermore, that more varied interpretations may arise under a single, overt suffix: *nuclear*, for example, may mean 'related to nuclear science', but also 'important', or 'angry' (Beard 1991, see Section 3.2). These uses have not been described as exocentric, but they serve to illustrate that a wider range of interpretations can be derived with a single suffix. There seems, therefore, little means of constraining the kinds of interpretation and indeed the number of interpretations that a given suffix may produce. Thus, though this does not entail that an exocentric interpretation such as that of *mouse* cannot be derived by 'δ', as the original categoriser 'ø' would be equally capable of assigning the same interpretation, parsimony would again suggest that this is not necessary.

Where 'δ' proves instrumental, however, is in conditioning of allomorphy. As an initial illustration of the analysis to be pursued, consider the set of classical plurals below. In (35a), nouns formed by suffixing a $\sqrt{\text{root}}$ with *-us* or *-a* may have an irregular plural. As can be understood from the regular plurals in (35c), though, this must be conditioned not solely by the suffix, but also by the particular $\sqrt{\text{root}}$. Significantly, (35b) shows that if an allomorphy-conditioning $\sqrt{\text{root}}$ takes any categoriser other than *-us* or *-a*, the resulting plural is regular. Strikingly, perhaps, the derivations of irregular *genera* and regular *genes* suggest this generalisation[15] holds even when the different categoriser is null:

15 A more comprehensive understanding of the predicted patterns of allomorphy as conditioned by different categorisers would require a cross-linguistic investigation which, again, is beyond the remit of the present study. It should be noted, though, that an analysis of Latin would differ significantly from that provided for the examples in (35), which are considered to be idiosyncratic from the point of view of the modern English speaker or learner. In Latin,

(35)

a.	*radius*	*radii*	b. *radian*	*radians*
	formula	*formulae*	*formulary*	*formularies*
	vertebra	*vertebrae*	*vertebrate*	*vertebrates*
	genus	*genera*	*gene*	*genes*
c.	*campus*	*campuses*	cf. *camp, camping*	
	foetus	*foetuses*	*foetal*	
	phobia	*phobias*	*phobic*	

Derivation of the two plural forms *radii* (ɹeɪ.di.aɪ) and *radians* is presented below. Note that for (36a), it would be possible to analyse the suffix *-i* as corresponding to either the categoriser or the plural, though for the purposes of illustration, the given VI rules consider this an exponent of the plural suffix, and thus the categoriser to spell out as a null allomorph.

(36) a. [[$\sqrt{\text{radi}}$] -us$_n$] PL *radii*
b. [[$\sqrt{\text{radi}}$] -ian$_n$] PL *radians*

(37) a. PL → *-i*/$\sqrt{\text{radi}}$] -us$_n$] __
b. PL → *-s*
c. -us$_n$ → ø/$\sqrt{\text{radi}}$] __] PL

As the root $\sqrt{\text{radi}}$ and the plural morpheme are equally local in the structures (36a) and (36b), the specification of the categoriser *-us* in the VI rule (37a) crucially acts to prevent allomorphy from being conditioned when the same $\sqrt{\text{root}}$ is categorised by *-ian* or indeed any other categorial suffix: other regular plurals derived from $\sqrt{\text{radi}}$ would include *radios, radars*, and *radials*.

The same logic is taken to derive the regularisation of allomorphy that has been associated with exocentricity. An equivalent derivation of *mice* and *mouses* is therefore presented below, which demonstrates both how a null categoriser must be specified in a VI rule like (38a) and, consequently, the necessity of 'δ"s presence in accounting for regularisation.

(38) a. [[$\sqrt{\text{mouse}}$] ø$_n$] PL *mice*
b. [[$\sqrt{\text{mouse}}$] δ$_n$] PL *mouses*

---

derivation of plurals such as *radii*, or indeed *campi*, is systematic (membership of a declension class notwithstanding), which makes possible an analysis in which the apparent suffix is an allomorph conditioned by interaction of the category and plural morphemes only, as discussed in the previous footnote.

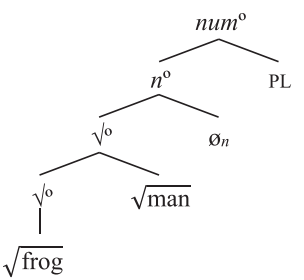
(39) a. $\sqrt{\text{mouse}} \rightarrow$ *mice*/__] ø_n] PL
b. $\sqrt{\text{mouse}} \rightarrow$ *mouse*

To reiterate, the rule in (39a) crucially specifies that allomorphy is conditioned via the categoriser 'ø_n'. As applied to the structure in (38a), this derives the irregular plural *mice*. The different categoriser 'δ_n' in (38b), however, effectively causes an intervention effect, meaning that the rule's context is not met, leading to regularisation as *mouses*.

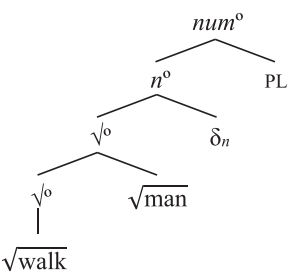
The complementary derivation of endo- and exocentric compounds is shown below. The structure of *frogman* is categorised by the same morpheme as in simple *man*, meaning that allomorphy can be conditioned by the same rule as derives *men*, repeated from (26a). In the same way as for the simplex derivations above, the different categoriser that applies to exocentric *walkman* prevents this rule from applying in (40b).

(26a) $\sqrt{\text{man}} \rightarrow$ *men*/__] ø_n] PL

(40) a.



b.



Under this analysis, derivation of the regularisation of allomorphy associated with exocentricity requires a particular structural configuration, namely that a given $\sqrt{\text{root}}$ be categorised by a 'δ' morpheme, ie. one that is not specified in a VI rule that otherwise targets the $\sqrt{\text{root}}$. By contrast, derivation of exocentric interpretation cannot be assumed to similarly require a distinct structure, as there is no means of determining or limiting the interpretations available underneath an initial categoriser. As noted above, though, the properties that characterise an interpretation as exocentric have for the most part only been defined informally. Where this has led to a range of conversion morphemes being proposed to cause an anti-locality effect, the proposed different categorisers (which may even bear features like conversion morphemes) permit stricter adherence to principles of locality and interpretation in DM.

3.2 The compound bracketing paradox

The analysis of morphological allomorphy developed above is not a complete account of what has been termed the Compound Bracketing Paradox. Apart from allomorphy, there remain three additional issues that define the paradox (in addition to the references above, see also Bolinger 1967; Pesetsky 1985; Beard 1991; Newell 2005, Newell 2018, and references therein), which the analysis developed in Section 2 may bear on.

The first issue relates to the complexity of the suffix's complement: if a suffix may be external to a compound structure then, conceivably, it may also be external to other complex structures. The fact that coordinate structures cannot be suffixed is problematic under such a view, with the issue being compounded by the fact that such examples need not display allomorphy, meaning that ungrammaticality cannot be simply attributed to locality of the type discussed above not being met. These facts are considered alongside examples presented in Section 2.2, which showed that coordinate structures can, however, serve as compound non-heads.

(41) *Neil is a...* a. *[*nuclear physic- and organic chem*]*ist*
b. *[*English grammar and Scottish histor*]*ian*

(42) *Neil read a* [*physics and chemistry*] *book*

In comparison to (41), in (42) merger of a coordinate structure and a $\sqrt{\text{root}}$ (corresponding to the head of a compound) is acceptable. It is argued here that this simply reflects a restriction on categorial suffixes, namely that they cannot merge with phrases,[16] as opposed to heads (i.e. $\sqrt{}^{o}$ or x^{o}), as have been argued to correspond to the compound structures considered here. Evidence for this restriction is found elsewhere in English, if it is noted that phrasal compounds (Harley 2009) are more productive than suffixed phrases:

(43) a. *Neil is a '*[$_{\&P}$ *we must learn from history*] *politician'*
b. **Neil is a '*[$_{\&P}$ *we must learn from history*]*-ian'*
c. ??*The '*[$_{\&P}$ *we must learn from history*]*-ness' of Neil's speeches proved tiring*

16 This analysis requires that coordination create a phrasal structure, hence '&P'. Though there is no universally accepted syntactic-semantic representation of coordination, representation as a syntactic phrase is common. For an opposing view that coordination has no syntactic representation, see Cormack and Smith (2005).

The second part of the paradox is that certain suffixed compounds are unviable despite merger of the compound head and suffix otherwise being well-formed:

(44) a. *sheet metal* b. **sheet metallic* c. *sheet metal-like*
pop music **pop musical* *pop music-ish*

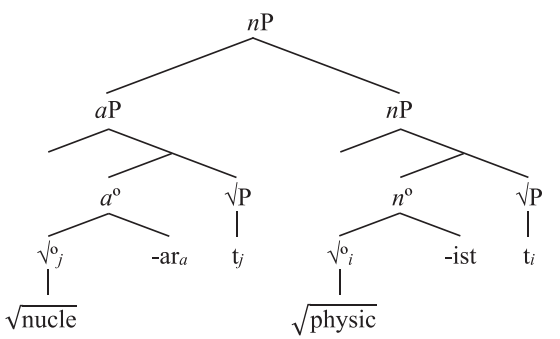
The resolution to this issue lies in the contemporary treatments of Level-phenomena discussed in Section 2.1. The issue with examples of the type in (44b) is that they involve $\sqrt{\text{root}}$-affixation. As such, in a DM implementation, an example like *sheet metallic* (45a) would be isomorphic with its apparent complement *sheet metal* (45b).

(45) a. [[$\sqrt{\text{sheet}}$] $\sqrt{\text{metal}}$] $\emptyset_n$
b. *[[$\sqrt{\text{sheet}}$] $\sqrt{\text{metal}}$] -ic$_a$
c. [[[$\sqrt{\text{sheet}}$] $\sqrt{\text{metal}}$] $\emptyset_n$] -like$_a$

Taking the idiosyncratic interpretation of *sheet metal* to be a product of the nominal compound structure in (45a), the unavailability of this interpretation in *sheet metallic* is attributed to the lack of containment of this structure in (45b). Suffixation by a category-selecting suffix (45c), by contrast, maintains this interpretation as this permits containment of the required nominalised structure.

The final part of the paradox relates to ambiguity of interpretation. For present purposes, this means that an interpretation in which the compound's non-head takes scope over the suffix must still be derivable. This interpretation is taken to simply be derived in syntax, rather than morphosyntax. That is, under this reading, an example like *nuclear scientist* is not a compound, contrary to what is implied by the structure in (19b). Instead, *nuclear* is an adjective that takes high scope in a syntactic structure, ie. as an adjunct to an *n*P headed by the noun *physicist*:

(46)



This offers a simple means of understanding a number of interrelated points concerning the adjective's interpretation. The first is that, in an adjunct position, an adjective can be modified by an adverb. This is not possible when the adjective is the non-head of a compound, as this would involve modification of a nominal structure by an adverb.

(47) a. *Mary is a* [$_{n\mathrm{P}}$ [$_{a\mathrm{P}}$ *typically British*] *historian (of Ancient Rome)*]
b. **Simon is a scholar of typically* [$_{n^0}$ *British history*]

Next, as may be intuited from (47a), when the adjective takes high scope, the original compound is in no way entailed, as is reflected in the fact that there is no compound contained in such a structure. Thus, in the case that *nuclear* takes high scope and is interpreted in the same way as in *nuclear physics*, the given physicist (who despite, presumably, being radioactive) need not specifically work in nuclear physics.

(48) *Felix is a nuclear physicist (because of an accident)*

The last point relates to the alternative interpretations that Beard (1991) shows are possible for examples like (48), namely that that *nuclear* may also be interpreted as meaning 'central' or 'important' (or 'angry'). Again, this idiosyncrasy cannot be related to any compound structure, as the interpretation remains available in structures for which there is no corresponding compound:

(49) a. *Felix is a nuclear physicist (because of his expertise)*
b. The Sound Pattern of English *is a nuclear book for anyone studying linguistics*

Neither the 'regular' interpretation in (48), nor the idiosyncratic interpretation in (49a), is evidence that at some point in the derivation there must be a morpho-syntactic representation in which the adjective takes scope over the suffix. Furthermore, given the locality-based analysis in Section 2.3, nor is such a structure required for the conditioning of allomorphy. This interpretation is, therefore, best understood as syntactic: this provides a simple explanation of the facts about adverbial modification and entailment, but does not preclude the adjective from having any particular interpretation that may also exist in a compound structure.

There remain several other types of bracketing paradox (see Newell 2018 for a contemporary and comprehensive discussion), the best known of which concern the interaction of the comparative suffix *-er* and the Level I suffix *-ity* with

the prefix *un-*, as exemplified by *unhappier* and *ungrammaticality*. Understanding each of these paradoxes requires significantly more analysis that can be offered presently, but one final point can be raised. Unlike *nuclear scientist* and related examples, these paradoxes do not create ambiguity – the suffix in each always takes scope over the prefix. Although this does not preclude the possibility that a prefix may take high scope in a morphosyntactic structure, it seems reasonable to assume that *un-*, as a bound affix, cannot take high scope as has been proposed here, in an adjunct position (though see Svenonius (2008) on prepositional prefixes).

4 Conclusion

Idiosyncratic meaning and phonology in compounds can be derived according to the more varied and articulated structures compounds may be considered to have within the framework of Distributed Morphology. Decomposability – that is, the predictability of the relation between the compound's head and non-head – has been shown to depend on whether the compound's non-head is categorised, or is a bare $\sqrt{\text{root}}$. Compound structures have also served to illustrate that current theories of morphological allomorphy depend on the locality of an interacting $\sqrt{\text{root}}$ and affix, but that this does not entail constituency. This has also has necessitated the development of a finer-grained understanding of the distinction between endocentric and exocentric structures.

In developing these analyses, several structural properties have been proposed which would be relevant to the development of a larger typology of compounding. There remain many other types of compound structure that would need to be accounted for in any such study, not least coordinate compounds, phrasal compounds, left-headed compounds, and compounds with linking morphemes. Should this task be pursued, there is no doubt much more that could be learned from the study of compounds, not only as related to morphology and syntax, but also to phonology, semantics, and indeed the interaction between these disciplines.

Acknowledgements: The current version of this work was presented in part at the 2016 Meeting of the LAGB (York), at Roots V (London, 2017), whose audiences are thanked for their valuable observations and questions. I would also like to thank the colleagues and students whose comments have been beneficial to the work in its many iterations. This includes Adam Albright, Hagit Borer, Éva Lángi, Ad Neeleman, and Andrew Nevins, and also Antonietta Bisetto, Emiliano

Guevara, and Sergio Scalise, whose classes I took while as an Erasmus student in Bologna in 2006, and to who my interest in compounds can be very clearly traced. All errors, omissions, and mistakes are my own.

References

Ackema, Peter & Ad Neeleman. 2004. *Beyond morphology: Interface conditions on word formation*. Oxford/New York: Oxford University Press.

Acquaviva, Paolo. 2009. Roots and lexicality in distributed morphology In Alexandra Galani, Daniel Redinger & Norman Yeo (eds.), *Papers from the fifth york-essex morphology meeting*, 1–21. York: York Papers in Linguistics Series 2, Issue 10.

Allen, Margaret 1978. *Morphological Investigations*. PhD Dissertation, University of Connecticut.

Anagnostopoulou, Elena & Yota Samioti. 2013. Allosemy, idioms, and their domains: Evidence from adjectival participles. In Raffaella Folli, Christina Sevdali & Robert Truswell (eds.), *Syntax and its limits*, 218–250. Oxford/New York: Oxford University Press.

Anagnostopoulou, Elena & Yota Samioti. 2014. Domains within words and their meanings: A case study. In Artemis Alexiadou, Hagit Borer & Florian Schäfer (eds.), *The syntax of roots and the roots of syntax*, 81–111. Oxford/New York: Oxford University Press.

Arad, Maya. 2003. Locality constraints on the interpretation of roots: The case of Hebrew denominal verbs. *Natural Language and Linguistic Theory* 21. 737–778.

Arad, Maya. 2005. *Roots and patterns: Hebrew morpho-syntax*. Dordrecht: Springer. Studies in Natural Language and Linguistic Theory 63.

Aronoff, Mark. 1976. *Word formation in generative grammar*. Cambridge, MA: MIT Press, Linguistic Inquiry Monographs.

Arregi, Karlos & Andrew Nevins. 2014. A monoradical approach to some cases of disuppletion. *Theoretical Linguistics* 40(3–4). 311–330.

Baker, Mark C. 1988. *Incorporation: A theory of grammatical function changing*. Chicago: University of Chicago Press.

Beard, Robert. 1991. Decompositional composition: The semantics of scope ambiguities and "Bracketing Paradoxes.". *Natural Language and Linguistic Theory* 9(2). 195–229.

Belder, Marijke De 2011. *Roots and Affixes: Eliminating lexical categories from syntax*. PhD Dissertation, Utrecht University.

Bobaljik, Jonathan David. 2012. *Universals in comparative morphology*. Cambridge, MA: MIT Press.

Bolinger, Dwight. 1967. Adjectives in English: Attribution and predication. *Lingua* 18. 1–34.

Borer, Hagit. 2005. *In name only, structuring sense*, vol. *I*. Oxford/New York: Oxford University Press.

Borer, Hagit. 2009. Compounds: The view from Hebrew. In Rochelle Lieber & Pavol Štekauer (eds.), *The Oxford handbook of compounding*, 782–813. Oxford/New York: Oxford University Press.

Borer, Hagit. 2014. The category of roots. In Artemis Alexiadou, Hagit Borer & Florian Schäfer (eds.), *The syntax of roots and the roots of syntax*, 112–148. Oxford/New York: Oxford University Press.

Chomsky, Noam. 1970. Remarks on nominalization. In Roderick Jacobs & Peter Rosenbaum (eds.), *Readings in english transformational grammar*, 184–221. Waltham, MA: Ginn.
Chomsky, Noam. 2001. Derivation by phase. In Michael Kenstowicz (ed.), *Ken Hale: A life in language*, 1–52. Cambridge, MA: MIT Press.
Chomsky, Noam & Morris Halle. 1968. *The sound pattern of english*. New York: Harper & Row.
Cormack, Annabel & Neil Smith. 2005. What is coordination? *Lingua* 115(4). 395–418.
Creemers, Ava, Jan Don & Paula Fenger. 2017. Some affixes are roots, others are heads. *Natural Language and Linguistic Theory* 36(1). 45–84.
Davies, Mark 2013. Corpus of Global Web-Based English: 1.9 billion words from speakers in 20 countries (GloWbE). http://corpus.byu.edu/glowbe
Dowty, David. 1988. Type raising, functional composition, and non-constituent conjunction. In Richard T. Oehrle, Emmon Bach & Deirdre Wheeler (eds.), *Categorial grammars and natural language structures*, 153–197. Dordrecht: Springer.
Embick, David. 2010. *Localism versus globalism in morphology and phonology*. Cambridge, MA: MIT Press, Linguistic Inquiry Monographs.
Folli, Raffaella & Heidi Harley. 2005. Consuming results in Italian and English: Flavors of *v*. In Paula Kempchinsky & Roumyana Slabakova (eds.), *Aspectual inquiries*, 1–34. Dordrecht: Springer, Studies in Natural Language and Linguistic Theory.
Hacken, Pius ten. 2009. Early Generative Approaches. In Rochelle Lieber & Pavol Štekauer (eds.), *The Oxford handbook of compounding*, 54–77. Oxford/New York: Oxford University Press.
Halle, Morris & Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In Ken Hale & Samuel Jay Keyser (eds.), *The view from building 20: Essays in honor of Sylvain Bromberger*, 111–176. Cambridge, MA: MIT Press.
Halle, Morris & Alec Marantz. 1994. Some key features of distributed morphology. In Andrew Carnie, Heidi Harley & Tony Bures (eds.), *Papers in phonology and morphology*, 275–288. Cambridge, MA: MITWPL.
Harley, Heidi. 2006. The morphology of nominalizations and the syntax of *v*P. In Anastasia Giannakidou & Monika Rathert (eds.), *Quantification, definiteness, and nominalization*, 321–343. Oxford/New York: Oxford University Press.
Harley, Heidi. 2009. Compounding in distributed morphology. In Rochelle Lieber & Pavol Štekauer (eds.), *The Oxford handbook of compounding*, 129–144. Oxford/New York: Oxford University Press.
Harley, Heidi. 2014. On the identity of roots. *Theoretical Linguistics* 40(3–4). 225–276.
Kiparsky, Paul. 1973. "Elsewhere" in Phonology. In Stephen R. Anderson & Paul Kiparsky (eds.), *A festschrift for Morris Halle*, 93–106. New York: Holt: Rinehart and Winston.
Kiparsky, Paul. 1983. Word-formation and the lexicon. In Frances Ingemann (ed.), *Proceedings of the 1982 Mid- America linguistics conference*, 3–29. Lawrence, KS: University of Kansas.
Kiparsky, Paul. 1985. Some consequences of lexical phonology. *Phonology Yearbook* 2. 85–138.
Kiparsky, Paul. 1997. Remarks on denominal verbs. In Alex Alsina, Joan Bresnan & Peter Sells (eds.), *Complex Predicates*, 473–499. Stanford, CA: CSLI Publications.
Lees, Robert B. 1960. *The grammar of English nominalizations*. Bloomington/Den Haag: Indiana University Press/Mouton.
Levi, Judith N. 1978. *The syntax and semantics of complex nominals*. New York: Academic Press.
Lowenstamm, Jean. 2014. Derivational affixes as roots. In Artemis Alexiadou, Hagit Borer & Florian Schäfer (eds.), *The syntax of roots and the roots of syntax*, 230–258. Oxford/New York: Oxford University Press.

Marantz, Alec. 1997. No escape from syntax: Don't try morphological analysis in the privacy of your own lexicon. In Alexis Dimitriadis, Laura Siegel, Clarissa Surek-Clark & Alexander Williams (eds.), *Proceedings of the 21st annual Penn linguistics colloquium*, vol. 4, 201–225. Philadelphia: University of Pennsylvania Working Papers in Linguistics.

Marantz, Alec 2001. Words. Manuscript, MIT.

Marantz, Alec. 2013. Locality domains for contextual allomorphy across the interfaces. In Ora Matushansky & Alec Marantz (eds.), *Distributed morphology today*, 95–115. Cambridge, MA: MIT Press.

Marvin, Tatjana 2002. *Topics in the Stress and Syntax of Words*. PhD Dissertation, MIT.

Moskal, Beata. 2015. Limits on allomorphy: A case study in nominal suppletion. *Linguistic Inquiry* 46(2). 363–376.

Moskal, Beata & Peter W Smith. 2016. Towards a theory without adjacency : Suppletion constrained by accessibility. *Morphology* 26. 295–312.

Neeleman, Ad & Krista Szendrői. 2007. Radical pro drop and the morphology of pronouns. *Linguistic Inquiry* 38(4). 671–714.

Nevins, Andrew 2016. Lectures on postsyntactic morphology. Manuscript, UCL. Lingbuzz 002587.

Newell, Heather. 2005. Bracketing paradoxes and particle verbs: A late adjunction analysis. In Sylvia Blaho, Luis Vicente & Erik Schoorlemmer (eds.), *Proceedings of Console XIII*, 249–271. Leiden: SOLE, University of Leiden.

Newell, Heather 2017. English lexical levels are not lexical, but phonological. Manuscript, UQAM. Lingbuzz 003898.

Newell, Heather 2018. There are no bracketing paradoxes, or how to be a modular grammarian. Handout from presentation at GLOW 2018, Budapest. Lingbuzz 003964.

Partee, Barbara H. & Mats Rooth. 1982. Generalized conjunction and type ambiguity. In Paul Portner & Barbara H. Partee (eds.), *Formal semantics: The essential readings*, 334–356. Oxford/Malden,MA: Wiley Blackwell.

Patel-Grosz, P & P Grosz. 2010. On the typology of donkeys: Two types of anaphora resolution. In Martin Prinzhorn, Viola Schmitt & Sarah Zobel (eds.), *Proceedings of Sinn Und Bedeutung* 14, 339–355. University of Vienna.

Peitsara, Kirsti. 2006. MAN-compounds in English. In R. W. McConchie, Olga Timofeeva, Heli Tissari & Tanja Säily (eds.), *Selected proceedings of the 2005 symposium on new approaches in English Historical Lexis (HEL-LEX)*, 113–122. Somerville, MA: Cascadilla.

Pesetsky, David. 1985. Morphology and logical form. *Linguistic Inquiry* 16(2). 193–246.

Pinker, Steven & Alan Prince. 1988. On language and connectionism: Analysis of a parallel distributed processing model of language acquisition. *Cognition* 28. 73–193.

Raffelsiefen, Renate. 1999. Phonological constraints on English word formation. In Geert Booij & Jaap van Marle (eds.), *Yearbook of Morphology 1998*, 225–287. Dordrecht: Springer.

Ritter, Elizabeth. 1988. A head-movement approach to construct-state noun phrases. *Linguistics* 26(3). 909–929.

Scalise, Sergio & Antonietta Bisetto. 2009. The classification of compounds. In Rochelle Lieber & Pavol Štekauer (eds.), *The Oxford handbook of compounding*, 34–53. Oxford/New York: Oxford University Press.

Siegel, Dorothy 1974. *Topics in English Morphology*. PhD Dissertation, MIT.

Snyder, William. 2016. Compound word formation. In Jeffrey Lidz, William Snyder & Joe Pater (eds.), *The Oxford handbook of developmental linguistics*, 89–110. Oxford/New York: Oxford University Press.

Spencer, Andrew. 1988. Bracketing paradoxes and the English Lexicon. *Language* 62(4). 663–682.
Sproat, Richard. 1984. On bracketing paradoxes. In Margaret Speas & Richard Sproat (eds.), *Papers from the January 1984 MIT Workshop in Morphology (MITWPL7)*, 110–130. Cambridge, MA: MIT Working Papers in Linguistics.
Sproat, Richard 1985. *On deriving the lexicon*. PhD Dissertation, MIT.
Svenonius, Peter. 2008. Russian prefixes are phrasal. In Gerhild Zybatow, Luka Szucsich, Uwe Junghanns & Roland Meyer (eds.), *Formal description of Slavic languages*, 526–537. Frankfurt am Main: Peter Lang.
Weerman, Fred & Jacqueline Evers-Vermeul. 2002. Pronouns and case. *Lingua* 112(4). 301–338.
Wennerstrom, Ann. 1993. Focus on the prefix: Evidence for word-internal prosodic words. *Phonology* 10(2). 309–324.
Williams, Edwin. 1981. On the notions "Lexically related" and "Head of a word.". *Linguistic Inquiry* 12(2). 245–274.